and nearer than India on his eastern frontier he could not have found herds of this animal, while the Rutennu, a very Indo-Chinese looking race, brought as tribute to Egypt, in the reign of the great conqueror, the *white* elephant, painted red and white, with gilded ears and toes. Had the fame and terror of the Egyptian conqueror reached the confines of Burmah, and the princes of Indo-China propitiated the Egyptians with that expensive present, a white elephant. All this occurred about 1600 B.C., and eight centuries later, in the reign of Shalmanser II., the elephant, as a rare animal, figures on the obelisk found at Nimroud depicted in a style far inferior to the Egyptian. The mutilated mummy of Thothmes has been found at the Deir-el-Bahari, and all that remains is inadequate to give an idea of his person. His successors came into conflict with the Khita, the supposed Hittites, but so did the Ptolemies long after the Hittite kingdom is supposed to have been extinguished. The account of the Pharaoh Khuenaten and the obscurity which prevails about the succession after that heretic, might have been enlarged, and a little more said about the Pharaoh Horus and the historical difficulties about his reign. The hypothesis of Brugsch Pacha, that he reigned twenty-one years, is plausible to superficial observation, but not acceptable on deeper reflection; but these are Egyptological points not in the absolute province of an historian, unless on separate independent philological research. The theory of Brugsch Pacha, that the invasion of Egypt by the Libyans was accompanied, not by Greeks and the people of the Isles, but by Colchian tribes from the Caucasus, although supported by ingenious philological reasons, is not accepted by Ebers and others, and is not entertained in the work. This account of the nineteenth dynasty and the route of the Exodus, it has been already pointed out, does not correspond with the physical conditions of the country or the late surveys, but then the original error is due to the French engineer whose hypothesis was too hastily seized on and proved with too much special pleading. The history of the twenty-first dynasty is only imperfectly known, but here the recent discoveries have thrown additional light on this obscure period. The mummies at the Deir-el-Bahari have aided in the determination of the succession, and it is evident that these high priests were not only descended from the Princes of Æthiopia, who, originally appointed by the Pharaohs, maintained a kind of hereditary succession, but also belonged to the black races, the flesh of Pinotem II. being unusually brown, and revealing a Nigritic descent, there was a strange similarity with the features of Khuenaten, who also probably appertained to the same race. The hypothesis that Shishak was an Assyrian king or prince is not confirmed by the annals of Assyria nor Nimroud, whose Egyptian name Namruth is supposed to have the meaning in the Æthiopian dialect of Panther. But the name of Nimroud is not yet identified either in the Assyrian or Babylonian, and although the names of Assyrian persons mentioned in Egyptian have little resemblance with those given by the Assyrians themselves, still ingenuity might convert Pul Ashar-nes into Assur-Nazir-Pal, who ruled some time about the period. The Æthiopian dynasty is given with some detail, but there is some difficulty about the Æthiopian Piankhi, who conquered the supposed dodekaroty or rulers, who presided over Egypt according to the Assyrian annals, and whose names are recorded on the historical cylinders of Assurbanihabla, or Assur-banipal, and enter into Egyptian history. The position of Piankhi is placed immediately before the twenty-sixth dynasty, on account of his having for antagonist Tefnekht or Tnephakhthus, the father of Bokkoris, king of the twenty-fourth line. But Piankhi's name occurs amongst the kings of the twenty-first dynasty, and Piankhi may have been placed too low in the series. The Æthiopian invasion of Egypt is amply detailed in the Assyrian annals, but the information of the Egyptian monuments about Sabaco and Tirhakah is scanty.

The "Egypt of the Past" may be safely commended to the general reader as containing in a lucid form all the contributions of monumental sources to Egyptian history; it is not too long nor detailed, and is in a portable form. The plates are very well executed, especially the woodcuts; the coloured lithographic ones are gaudy and hazy in the style of Turner, but as that is supposed to represent a kind of aërial perspective of the highest order, it will no doubt commend itself to æsthetic minds. It is, however, a good work, and well got up.

OUR BOOK SHELF

Natural Philosophy for London University Matriculation. By Edward B. Aveling, D.Sc. (London: Stewart and Co., 1881.)

WITH text-books innumerable devised specially for their use, it would be remarkable if candidates for the London matriculation should fail in natural philosophy. That so large a proportion should fail in this subject, as is the case, must be due not to the quantity, but to the quality of their sources of instruction. What then must be said of a teacher who takes upon himself to venture on the scene with an inferior and trashy work in which all the worst blunders of the exploded text-books of a past date are reproduced? Although the writer of the book lying before us professes his indebtedness to the excellent manuals of Dr. Wormell and Mr. Philip Magnus, and to the invaluable assistance of his friend Mrs. Annie Besant, he cannot be congratulated on his success in following in the tracks of his predecessors. His book is, in fact, a cram-book of the worst and weakest type. The barest minimum of the subject divided into the inevitable Statics and Dynamics constitutes the programme; Optics and Heat being somehow thrown in along with Moving Bodies as divisions of the latter of these two branches.

Passing over the Introduction, we arrive at the heading "Definition and Divisions," where the serious business of teaching natural philosophy begins with the words: "From its earliest years a child is surrounded by a world of beauty and of mystery," and the author proceeds anon to advance grave arguments for the conclusion "force, then, is the cause of motion." After this it is not very surprising to read (p. 165) that as the "phrase 'change of velocity' is cumbersome, it is replaced by the exceedingly important word 'acceleration.'" And then, as if the author were not sure whether to give us too little or too much in his definitions, we are told in the very next sentence: "Acceleration is the change of velocity per unit of time *that occurs in a unit of time*"! That this is no mere *lapsus calami* is clear from the next page, where it is twice stated that acceleration is the "change of velocity per second *that occurs in one second.*" Yet the author expressly states that "variable acceleration is not within our

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ken in this book." The Second Law of Motion is given in the imperfect Whewellian instead of the perfect Newtonian form, in which all the best treatises on dynamics have given it since the salutary return to Newtonian precision was inaugurated by Thomson and Tait. On p. 198 the author proposes to measure gravity on an Atwood's machine, with a falling mass of one centigramme. Did he ever try the experiment? On p. 241 the student is told that the Torricellian vacuum is to be found in the space left by the mercury at the top of a *thermometer*. Under the heading of Calorimeters (which instruments, by the way, are nowhere described) the novice is informed that "Joule established the fact that 772 pounds of mass falling through one foot give out a thermal unit"; from which it would appear that heat is the product of a mass into a length. Bad as this is, it is pardonable beside a passage in the introductory part of the book (p. 10), in which the reader is assured that a force generates heat at the point of its application when the point of application does not move forward. One grows weary of gathering from the rank crop of blunders; but a final example—the very last sentence of the book—shows the accuracy of our author's physical knowledge as displayed in his theory of dew. "A tarpaulin spread over the ground, or nature's tarpaulin of clouds, will *reflect* the *radiating rays* (sic) of heat, and under the tarpaulin or clouds dew is not deposited."

"Let me start," says Dr. Aveling (p. 6), "with two truisms—(1) That no book is worth reading that is not worth analysing; (2) that the ideas enunciated by a teacher, either by voice or pen, are not thoroughly the ideas of the learner until they have been expressed again in his own words. If, therefore, that which I am about to write is in any sense useful, it will be worth the while of the student to make analysis thereof." What if the student's analysis throw unexpected light on the first of these truisms? S. P. T.

Der Völkergedanke im Aufbau einer Wissenschaft vom Menschen, und seine Begründung auf ethnologische Sammlungen. (Berlin, 1881.)

Die Vorgeschichte der Ethnologie. (Berlin, 1881.)

THESE two pamphlets, by Prof. Adolf Bastian, are written to promote the doctrine he is never weary of teaching, that the scientific method of studying man is the museum-method of collecting and classifying his results, whether these be weapons or idols, or myths or superstitions, or what not. When in a group of such things there comes into view a common principle or thought, this is a *Volksgedanke*, a manifestation of the popular mind, a definite something for the science of man to occupy itself about. It was the desire to get at such general principles of human action that led the late Prof. Waitz to compile his Anthropology, and Prof. Bastian has gathered, in the many volumes he has published, an even vaster museum of human facts. In the first-named of the two publications above, the reader will find collections of evidence as to many of the problems which are now occupying the minds of anthropologists, such as the primitive relations of the sexes, the development of the family and of property, and the belief in ancestral and patron spirits. The few lines of comment with which the author links together his pages of citations are of especial value, as giving his judgment of the meaning of the facts. In the second pamphlet the author traces the growth of anthropological museums out of the old cabinets of curiosities. Neither treatise is well suited to quote passages from, as these lose their value when disconnected from the rest, like single specimens taken out of the museum. Now and then Prof. Bastian makes a sort of holiday digression, for instance where he collects page upon page about modern European miracles, relics, and pilgrimages, about which he truly says, "the nature-peoples, with their rude, clumsy fetishes, are no match for the subtleties of super-refined civilisation" E. B. T.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Telescopic Definition in a Hazy Sky

THE diminution of star disks during temporary haze or even by a thin passing cloud has been particularly noticed by Sir John Herschel. The effect of this haze is apparently to diminish the intensity of diffraction phenomena. The markings on the full moon have never been seen so blackened and distinct as through the haze of a London fog. On one occasion a very gentle east wind brought down a London fog to Reading. That evening the air was extremely still, but embrowned with the haze. Castor bore a magnifying power of 600 with a Wray $5\frac{1}{4}$ achromatic. The object-glass was being adjusted to the axis of the tube. Finally an intense jet black ring was seen to surround each star of this celebrated double, supplemented with one bright perfectly defined diffraction-ring, then a fainter ring at a further distance could be descried. The perfection of this definition has never since been attained. The haze had settled down into still air. The eastern breeze had died away. The brown fog remained in the sky; diffraction assumed its most perfect form. The moon bore any power I could muster with absolutely steady definition. These states of the atmosphere are extremely rare. I can now record a repetition of this wonderful steadiness. On November 9 Col. Abadie, Mr. Maunsel, and myself, were observing Saturn with an $8\frac{1}{2}$ Calver mirror. The crape veil and belts were well shown with the pale blue Polar cap. Ball's division was intensely black. The outer ring was narrow, and its dark grey tint contrasted strongly with the brilliant whiteness of the inner ring. I was greatly astonished, however, to descry Encke's division on the outer ring usually called A. The shadows of the ball were well marked. The eastward shadow much stronger than the western. A very brilliant narrow band edged the northern belt near the plane of the rings. The inner edge of the ring B projected a thin shadow on the ball. A lady who had no previous knowledge of the belts, entering the observatory last night, said they appeared to consist of several fine lines of parallel bands separated by very fine brighter bands. At 11 p.m. there was a very wide narrow halo round the moon. Saturn appeared much bedimmed, and Jupiter shorn of his brilliance. Yet Col. Abadie writes: "Jupiter was a sight to be remembered. The distinctness of all the belts was enhanced by bright zones; one to the north of the uppermost belt was particularly to be noticed. The clouds between the equatorial belts changed in appearance from being very fleecy to a long wavy appearance" (we were observing about three hours). The moon was too dim for observation. Encke's division is so seldom seen in my experience, its appearance in the field of so small a telescope was a matter of great surprise; and but for the concurrent testimony of two others for about a space of three hours, I certainly should have greatly doubted the accuracy of the observation. At all events, it is a valuable demonstration of the value of the *chiaro-oscuro* in astronomical research.

Eastbourne, November 16 G. W. ROYSTON-PIGOTT

The Morteratsch Glacier

DURING my stay in the Engadine this summer I took the opportunity of making a few observations relative to the movement of the Morteratsch Glacier, which may be of interest to some of your readers. These observations were taken *inside* the artificial cave of the above glacier in preference to the surface, as I thereby obtained a more direct measurement with a fixed point, as will be shown presently, and greater protection for the provisionary stations, made in the ice, against disturbances of fluctuating temperatures or the curiosity of visitors. The arrangement was very simple, namely: in the roof of the cave 2—$\frac{3}{4}$ in. round staves 2 feet long were fixed, at a relative angle of 45°, in such a way, that they prevented each other from dropping out, and were further clamped together by a small metal band, from which a plumb-bob was

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